

AVIATION WEEK

A MCGRAW-HILL PUBLICATION

MAY 8, 1950



L-M's line of lights



*brings 'em in
safely!*

All over the world, L-M runway lights are bringing pilots in to safe landings—in all kinds of weather. For L-M lights more runways than do all other high intensity systems combined. L-M's complete line of runway lights fits all airports—from the smallest to the largest. For complete information ask the L-M Field Engineer or Airport Lighting Division, Line Material Company, East Stroudsburg, Pennsylvania. (Line Material is a McGraw Electric Company division.)

Above, left to right: L-M's famous extreme high intensity unit—180,000 cp with controllable beam, CAA-approved, L-818; new fixed focus bi-directional high intensity unit, CAA-approved, L-819. Medium intensity unit for secondary runways, taxiways, and smaller airports, CAA-approved, L-802.



LINE MATERIAL...Airport Lighting



YOU CAN BE **SURE**... IF IT'S
Westinghouse



J-34 TURBOJETS

power the Lockheed XF-90 penetration fighter

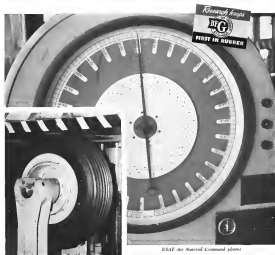
The tactical sweeps assigned to this Air Force fighter take it far beyond enemy fires. Such missions demand the maximum in fuel economy, performance and reliability of the aircraft's power plant.

To meet these requirements, Lockheed selected Westinghouse J-34 Turbojets. Their small form

and light weight... characteristic of Westinghouse axial flow design... make possible high performance fighters like the XF-90.



Westinghouse
AVIATION
GAS TURBINES



USAF Air Marshal Command photo

New B. F. Goodrich wheel carries record load of 60,000 pounds!

THE AIR FORCE needed a new wheel for North America's B-45—a 56 x 16 wheel with the unheard-of load rating of 60,000 pounds! There alone 15,000 pounds more than the strongest wheel made could carry.

B. F. Goodrich engineers went to work on the problem. They made dozens of design improvements, always with the goal of greater strength without major increases in weight and size.

You can see the results for yourself in the USAF photos above. The old

on the scale had never made 60,000 pounds load in the new B. F. Goodrich wheel due to taking the enormous load. This wheel—with the greater load rating of top airplane wheel in current production—has never stood up under our loads of 300,000 pounds! It has passed test after test with flying colors.

Used on North America's B-45 (Boeing's B-47 model), the new B. F. Goodrich wheel is equipped with the new BFG quarter-type bolts and BFG Type VII tires.

No matter what your loading gear experience problems are, it will pay you to get the help of B. F. Goodrich engineers—pioneers of most of the major developments in test equipment. Write to The B. F. Goodrich Company, Aeronautical Division, Akron, Ohio.

B.F. Goodrich
FIRST IN RUBBER

Wisconsin Central Airlines finds "COMMUTER SERVICE" PAYS



Increasingly regularly are Wisconsin Central Airlines scheduled service between cities and to various points in Wisconsin, Michigan, Minnesota and Illinois. In summer flying moderate air popular. Throughout the year, fast new carriers cover their routes more quickly, better, when get more easily to the big cities for shopping. Wisconsin Central personnel are friendly and efficient. — Right dependability is assured by the most modern equipment, and the use of Texaco Aviation Lubricants and Fuels.

Progressive airline provides fast, dependable service ... uses dependable lubricants and fuels—TEXACO

Covering the four-state area shown on the map, Wisconsin Central Airlines has tapped a new and profitable market with its fast, convenient, short-stop service. In operating costs are among the lowest for feeder airlines—and Wisconsin Central credits this in large measure to the efficient engine performance insured by Texaco Aviation Lubricants and Fuels.

Airlines everywhere know that Texaco Aviation Products and Texaco Lubrication Engineering Service together keep efficiency high

and costs low. And that is why—

More routes and air miles in the U. S. are flown with Texaco Aircraft Engine Oil than with any other brand.

Let a Texaco Aviation Representative help you simplify your lubrication and maintenance procedures. Just call the nearest of the more than 2,000 Texaco Wholesale Distributing Places in the 48 States, or write The Texas Company, Aviation Division, 135 East 42nd Street, New York 17, N. Y.



TEXACO Lubricants and Fuels

FOR THE AVIATION INDUSTRY

TURN IN... TEXACO STAR THEATER showing ACTON 35131 on television every Tuesday night. See complete list for time and station.

WHO'S WHERE

In the Front Office

Roger Lewis has been appointed director of sales at Gates Wright Corp., a newly created position. He comes to G-W from Canadian Ltd., where he was general manager for more than 10 years. Lewis has been in aviation since 1918, and his first position was with Lockheed where he acted as building up that company's world wide sales organization.

Don E. Hume has been named regional manager of newly formed Sales division of American Spectator Co., Buffalo, N. Y. The new division will produce from cellular cellulose acetate expanded plastic seats in an extensive program under license agreement with E. J. de la Font of Neumes, de la Co. (Nemco) as production manager of the new division in Boston. E. Weisbach.

Arthur C. Smith, former sales traffic manager for Western Air Lines, has been promoted to vice president of American Airlines International for the airline, and M. E. Sullivan, formerly manager of sales and traffic, has been named director of traffic. Under the reorganization of W.A.L.'s sales department to provide a straight-line administrative set-up and adaptive new approach to field personnel, Smith and Sullivan will report directly to president. He plans to discontinue of sales administration will be Arthur C. Smith, manager of operations and distribution offices. Mrs. E. B. May-Dell has been promoted to manager of all administrative positions.

Merle W. Knapf has been appointed deputy director of the Civil Aeronautics Authority office of reports. His present CAA job is 1948, coming from sources division of New's Bureau of Texts and Books.

Walter H. Feldman has been named vice president of sales for Worthington Pump & Machinery Corp. John J. Kimmey, Jr. is now vice president of operations, Ephraim W. Thomas has become general manager of production and Customer Research has been named general mgr. sales and purchasing department.

Honors and Elections

B. B. Gibson rep of Socy Corp. will lead the transportation and utility voting group in the Greater New York Fund's 1953 campaign. For American Airways executive, J. Samuel Pope has received the 1953 Flight Commander of the Order of 50 Silver Star from Pope Pope 501.

Major G. P. Robinson, CBE, CBE, 1948 has been elected president of the Royal Aeronautical Society for 1948-49. E. E. Blodgett, president of Tishco, Inc., has been named president of the board of New York (N. Y.) Chamber of Commerce.

Law, Economics—Robert A. Stevenson, John W. Driggs and Don C. Smith have been elected vice directors, and Harold R. Eyer and William A. Lane have been elected to the board.

Robinson Elections—New board of directors for the coming year consists of G. S. Robinson, president, D. H. Robinson, vice president, and Robert S. Blodgett, G. A. Frost. Later are named to serve central post of board chairman.

INDUSTRY OBSERVER

►Meritt thatjet XB51 ground support bomber has added a new development (being at the top of its field) to smooth out airflow over the tail. With the wing over the tail surface it gives the change to the pilot that a day airplane is being sent out and behind him.

►Fifty Aviaton of Canada has started tests at Amherst, New Scotia, of first Canadian-built F4U Flyer, developed as a Canadian Navy trainer. Flyer is expected to replace U. S. built Grumman Avenger on the Canadian coast. May 1953.

►Sofel Helicopter Co., Wichita, received certification from CAA on its model S-4 helicopter (Aviation Week Apr. 24) and plans to produce 50 production S-4s within the next year.

►Kermela Metal expansion expects to be at least 15 months to 20 years before much of their new extended flight test (Aviation Week Apr. 24) shows up in reference, since it will take time to redesign equipment for its use. A 15,000-ton capacity expansion joint to produce about 5 ft. wide would cost an estimated \$6 to \$10 million.

►Cautious Motors will sponsor a night place near at Willow Run Airport for the Third International Air Fair of the Aero Club of Michigan, Aug. 11, 12 and 13. It will be a free-for-all show not sponsored by the club. The National Air Races, Cleveland, Labor Day weekend. Price scale will be comparable to last year, though no sponsor is found.

►New television transmission antenna developed by Glenn L. Martin Co. for its Scimitar project—boosting from airplanes at high altitudes for longer range—will mount on a movable base on top of aircraft tail, instead of increasing. Included among other tail fin engines, propellers and structural reinforcement. For landing, nose is turned from vertical operating position to horizontal attitude parking airplane. The little-known project has shown military application to guided missiles. "Wind, under USAF" sponsorship, has been quickly cancelled since 1947. Earlier antenna installation was a basic pre-arranged from manufacturing plant's belt.

►Second Douglas C-124A cargo transport is scheduled for delivery May 10. Production will be stopped up at Long Beach until September peak of four planes a month is reached.

►Assault transport competition was to begin at Wright Field this week between Northrop C-125A. Another in route plane and the Chase VC-122C. Both planes have 5000-hp. engines. Chase is powered with two Wright 1850-181 engines while Northrop's carry two Wright 1525-90 engines.

►USAF orders product a limited production contract for the Chase XC-121 out of 397.5 million 1948 fixed funds recently designated for emergency and ground handling equipment. The big multi-transport is now entering end of Phase II tests and will be taken over by JMC for special evaluation tests later in May.

►Schlenger device developed by Minneapolis Research for the Boeing B-47 bomber, in being transported by Northrop to the TRB-45A per Flight Wing due to 8, when a work or two. First two TRB-45A's 1-15 per engine installed in a bank at trailing edge, plus two additional 1-15 per attached in pods below wing. It is designed as a fully operational photo reconnaissance plane with better performance, in speed and useful load capacity than the eight-year TRB-49 which turned in a ground testing accident at Edwards AFB, Calif. May 1953.

►Final report of the chief of mission for the major Operation Panther is expected to show the following performance for the F4U, Republic Aviation Corp. was F-4U's of the 36th Fighter Group lost in the 25, victories in the air, 32, lost on the ground, 66, destroyed by the 25th in the ground, 79. The "Tadpole" was the first aircraft in Vietnam listed in the "list" of 50 F4U's and "list" of new defending F4U's, in the opinion of an official report attached to a Marine squadron (AVIATION WEEK Apr. 24). But this was only one engagement and the overall results, plus special action honors considered as war prizes, added the final score in favor of the F-4U, according to Republic.

These Sums Were Asked . . .

	In 1951 Budget	In Truman Message	For Total of 1950 Appropriation	Compared to 1950 Appropriation
For USAF	\$1565 million	\$200 million	\$1565 million	\$1220 million
For Navy	635 million	100 million	735 million	140 million

To Buy This Many Planes . . .

	1951	77	1460	1250
For USAF	817	100	917	798
For Navy				

\$300 Million More Slated for Aircraft

President, Congress seen in agreement; USAF, \$200 million, Navy, \$100 million.

The Truman Administration decided last week to back a \$300-million boost in Air Force and Naval procurement funds. It thereby sought to avert off a \$533-million air power increase by Congress in the 1951 budget. Prange of the raise is fairly certain, now that it has the President's blessing.

In an official message, the President requested:

• A \$300-million increase in the 1951 fiscal year budget in contract obligations for USAF procurement. With the \$1565 million provided in the budget, this would make \$1965 million available over the coming year for new plane obligations, compared with the \$1250 million being obligated this year.

• A \$100-million increase in the \$633 million recommended in the budget for Naval aircraft procurement. This would make \$733 million available over the coming year for new obligations, compared with the \$590 million for this year.

USAF funds have a good record in a striking force of 48 modern groups. Air Force now has 44 modern groups and five obsolescent groups. Increase would provide for the acquisition of 77 additional craft, for a total of 1460. This compares with USAF's procurement of 1250 planes this year.

• **Stop-Gap For Navy**—The Naval procurement boost amounts to only a partial stop-gap move to minimize deterioration of the Navy's aircraft as well. It would allow acquisition of 100 planes in addition to the 817 provided for in

More Billions

Relative estimates for the 1951 fiscal year defense budget are between \$3 and \$6 billion above the \$14.5 billion 1951 fiscal year budget. Most of the increase is for the strategic air arm. The boost is predicated on the integrated defense program of the 12 North Atlantic pact nations. North Atlantic Council, top policy group, meeting in London on May 15, will review and pass on the integrated program outlined by defense ministers last month at The Hague. Secretary of State Dean Acheson will approve the U. S. The U. S.'s primary role under the integrated plan is strategic bombing.

times Committee, had urged additional procurement funds to prevent a weakening in USAF's 45-group strength. Visson had proposed a \$533-million increase—\$200 million for USAF and \$333 million for the Navy—on the budget. The Joint Chiefs of Staff, unofficially, endorsed the Visson proposal. It was certainly on the eve of House acceptance of the Visson amendment (Aviation Week May 1) that the President signed the established increase.

Sequence of developments:

• Visson scheduled the four chiefs of staff to appear before a public session of his committee. With Senate shorting down U. S. plans, he said, Congress could hardly reject a proposal which the Joint Chiefs of Staff appeared as essential to the defense.

• Louis Johnson, Secretary of Defense, took command for involving defense expenditure. He brought to the House Appropriations Committee his proposal for a \$300 million increase in aircraft procurement funds for the fiscal year. He also indicated opposition of the Joint Chiefs before the Armed Services Committee.

• House Appropriations Committee promptly approved the Johnson amendment. "We have always been ready to support air power," Rep. George Mikes (D., Tex.), chairman of the Committee's armed services subcommittee, was quoted, "but this year we see no point in recommending funds which would not be used. We did that last year."

• Visson scheduled the new armaments arms with the Joint Chiefs and announced that he would also support the Johnson proposal and abandon plans

**Ram Jets
get a
'Flight
Engineer'**

► A **Wright** flight engineer would have to shrink to the size of a proton to operate a ram jet. He would have to withstand temperatures from -100°F to -170°F—pressures from that at 300 feet under water to that at 80,000 feet in the air. On top of that, calculations and tests 30 times that a second to complex mathematical problems.

► Yet the ram jet needs a flight engineer...and gets one in Wright Aircraft's new power control system. It performs automatically the functions of a flight engineer on a modern airplane.

► Actually it does a great deal more, for in ram jet operation, where supersonic speeds prevail, such wider ranges of air flow, temperatures and pressures are encountered than in any previous-type aircraft. The power control checks instantaneous changes in air density, determines the jet's fuel requirements, and actuates the engine's controls in a fraction of a second. Result...smooth, highly efficient engine performance.

► These power control units—and all other ram jet components—are now under development in Wright Aircraft's new ram jet laboratory. Here is another indication of this company's leadership in supersonic ram jet research and development.

Wright Aircraft Corporation, Ford-Ridge, New Jersey

CURTISS  WRIGHT

for a bigger boost for Naval aircraft personnel. "It takes care of the Air Force and will cut the situation with the Navy substantially for the time being," he commented.

► **President's official request** for all defense funds, reported "in the light of changing world conditions" was submitted the following day.

► **Vietnam Victory**—This was a victory for Vietnam and her staunch airpower advocates in Congress. Even if they had succeeded in securing the \$700-million program through Congress, the funds, without Administration approval, would be subject to sequestration. That's what happened in the 1950 million for USAF personnel to support a 70-group program voted for this year.

The House is expected to complete action on the 1950 fiscal year omnibus government appropriation bill of which the defense budget is a part—by the end of this week. Senate action may be held for a considerable time because of the impending fight over civil rights legislation.

Meanwhile, Adm. Patrick Swenson, heading on the proposed new \$375 million "strategic air" reference program before the House Armed Services Committee, stated that the Navy was to decide to push construction of the converted 51,000-ton flush-deck carrier, *United States*. Several members of the committee pointed out construction of its construction by Johnson. In a recent report the committee said that it "de-emphasizes the matter of cancellations . . . but, because of the present of . . . budgeting program at the present time and the existing budgetary limits . . . will withhold further action for the present in regard to construction of the vessel."

Airframe Shipments

Shipments of complete aircraft, measured in airframe weight, was 1,275,000 lb in Feb. 1952, according to the Bureau of Census and the Civil Aeronautics Administration. U. S. military customers took 35 percent of the airframe weight.

Civil aircraft shipped during the month amounted in 175 planes valued at \$7.9 million, compared with January shipments of 167 planes worth \$12.1 million. Report covers 14 complete aircraft, plus components, 39 facilities, and 13 engine companies operating 14 plants.

Aircraft engine shipped in February totaled 4,050,000 hp, with the military accounting for 90 percent of that power.

Employment of these plants for February was 162,741. 163,512 were employed in January. Employment in engine factories was 79,562, compared with 78,817 for the previous month.



C-124, demonstrated at Sevier, performs a tanker and lifts gun totaling 51,000 lb



C-47 Packet, largest, most powerful version of the C-52, loads on Army truck

'Swarmer' Shows Airlift Weakness

Improvement needed in air-transportable equipment, unloading methods, fighter cover, traffic control.

Camp Mackall, N. C.—Senators de Sevier and Strauss, both Republicans, have expressed their interest in the C-124, a new four-engine, high-altitude transport aircraft, in a letter to the Secretary of Defense. The letter was dated Feb. 1952, according to the Bureau of Census and the Civil Aeronautics Administration. U. S. military customers took 35 percent of the airframe weight.

As a result of these deficiencies, various of the combined staff and ground support elements (Aviation, War, May 1) expect service evaluation teams to call for:

- **New USAF emphasis** on steps to use maximum base now specified in its current ground landing.
- **New Army emphasis** on combat equipment—tanks and artillery—that can be carried with greater speed and efficiency by air.
- **Design** shortcomings—Part of the design team problems can be tied to design shortcomings of available planes that can be blamed on the military's ground landing equipment and use

in the field—when any equipment is available.

The question of making combat equipment more easily airtight, absorbent of fuel, or more absorbent to ground-to-air communication efforts to design that will be less bulky and use lighter materials.

► **Changes to C-124**—While the official critique of the C-124 is in progress, the Air Force is in the process of establishing and maintaining an aerial transport unit in the command.

► **The Army is ground-bound** by the poor weight of its equipment. For example, the Douglas C-124A (now in production but not used extensively during the war) would be restricted to movement of one 40,000-lb. medium tank per plane.

Use of such aircraft, moreover, would be restricted to proposed air transport, since the planes currently require a 5,000-lb. runway to clear a 50-ft obstacle.



AIR INVASION is simulated at Eastern Sevier by Fastrop from Fastrop

► **High jet fighter cover** already tested by the USAF (in the first test, bogged down both in its exact function and position of flying area for transport unit).

At crucial points during established meet and early operations of the aerial "invasion," this latest USAF technique of high altitude fighter support (mainly because of high jet fuel consumption) left short of expectations.

Aggressive forces eventually pushed through the complex defense net to select both air staging areas and the first and second landing areas.

► **First-line and production transports** were found deficient at staging areas and in particular of the critical landing strip, where landing time would be a critical factor.

Under "ideal" staging area conditions, where U. S. Forces close "absolute no uncertainty," the following load and unloading time factors were shown:

	Load Time	Unload Time
C-74	15	15
C-54	15	15
C-46	15	15
C-119	15	15
C-53	15	15

(Actually, Army equipment was loaded)

aboard transport aircraft by cradles or special makeshift methods used by Army engineers. Under actual warfare stress, this equipment might have collapsed. Rapid loading of C-54 transports was accomplished by a wooden elevator against the fuselage left door, which was closed by hand.

USAFA had no "conventional" loading equipment available.

► **Lack of coordination** between transport operations of USAF and Army airborne units was apparent.

Miss and material in para drops were wasted in an extent that could have spelled disaster in an enemy-dominated land area.

► **Air traffic control** of troop and cargo transports moving in to coordinate the whole was ineffective. Planes congested on the landing strip more rapidly than "in the field" traffic control could handle them.

These weaknesses were at a loss in the stress to place their (air) in unloading and were subsequently based on emergency procedure for leaving the airfield after discharging cargo.

► **Look Ahead**—Whatever the immediate changes to be passed from the committee, the committee was that

strong, long-range considerations, and realistic future steps will.

This is the need for funds for new equipment of those it is to be done with an emergency in mind.

The main volume of air transport planes now available for complete use are C-54s.

► **Committee**—Army planners appear fully cognizant that in a future conflict their actions would depend on close cooperation and support by both USAF and Navy. So they are all out for joint operations, plans and evaluation of equipment with an eye to Army needs.

But there is a feeling that USAF and Navy can only go so far to support a government-sponsored advanced transport prototype program.

The main is the lack of coordination of military and Air Force operations that a combination civil and military transport plane is like most combinations—neither completely satisfactory for either one.

► **Future**—The Air Force is in an important position behind Air Force history to go all out in support of a government-sponsored advanced transport prototype program.

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► **Future**—The Air Force is in an important position behind Air Force history to go all out in support of a government-sponsored advanced transport prototype program.

Prototype Proposal Gets Lease on Life

The double thumbs of continued British advances in air transport development and military warnings of a major deficiency in U. S. airlift capacity spurred a new drive in Congress last week for government development and most improvement of cargo and troop transport planes.

Sen. William Johnson and Owen Brewster jointly introduced two bills authorizing.

► **A \$125-million appropriation** to finance a five-year study program on new transport prototypes, particularly (airborne-powered aircraft, aircraft especially adapted to the accelerated transportation of troops and aircraft for the last-line operations. This program would be administered by Civil Aeronautics Administration. The bill was the outcome of joint efforts by Air Coordinating Committee civil and military

tary aviation agencies and has the co-development of the Budget Bureau and the two services.

■ **A \$100-million Airmail Development Corp.** for testing long-range cargo and transport planes for use in relief and other activities. Civil Aeronautics Board. The ADC authorized to spend \$100 million annually for research and development of new types. This bill was endorsed by the two services. The Budget Bureau and Department of Defense have previously opposed such a provision. Air Transport Association said it would create an excessive deficit, not justify the cost of potential traffic, and report "too much potential" into the country.

■ **ATA Views.** "It would be a major step toward government ownership of the airlines," ATA's general counsel, Stuart Epstein commented. "It is a national interest issue, not only the civilian economy would rely just as much on this as it does on the current relief bill and be just as much disrupted by its suspension as DDCs by the airline. Furthermore, the bill would be almost as good as a contract to a wholesale capture of their traffic by a government-subsidized carrier."

■ **Senator Connors-Johnson and Brewster** commented favorably on the long program.

"It is only a first step toward probe-type legislation," Brewster said. "But it seems to be the only program on which general agreement can be reached. I am in favor of probing the future of the nation, looking for a broader program to the future."

Johnson said "It is all right as it is given, but it doesn't go far enough. I want provision made for the development of a good basic plan to explore the DDC's, which the government could buy and test out on the feeder lines. It would go a long way toward solving their financial problems and relieve the government's fiscal situation. I am not worried about the truck lines. They will run out on their own. But I do think something should also be done to relieve the wider airfield deficiencies. That is 1000 times more important than developing a long-range jet transport for commercial operations."

■ **Senator Pearson-Johnson**, as chairman of the Senate Interstate and Foreign Commerce Committee, announced that hearings would open on the "air-mobility issue" on the two bills potential last week, and on several other bills designed to promote cargo and transport plane development reaching before the committee. These include:

- Two versions of the Brewster-Elmhurst proposal, from the 1948 recommendations of the Congressional Aviation Policy Board. These would set up a board, composed of representatives of

USAF, Navy, CAA, National Aviation Committee for Aeronautics, and Civil Aeronautics Board, which, under the direction of the Secretary for Air, would survey requirements and finance probe-type development. ATA in line against behind the measure. ATA's member ship never settled agreement. Individual manufacturers, notably Glenn L. Martin Co. and Consolidated Vultee Aircraft Inc. They anticipated that the prospect of cheap new types, on which the government had effect development costs, would raise airlines in deep production of 1950s and 1960s.

■ **An earlier version of the Airmail Development Corp.** bill was introduced by Johnson. Instead of setting up an independent corporation, the measure would place it under the Secretary for Air.

■ **Creation of a National Civil Aviation Council**, composed of the CAA Administrator, the Chief of the Army Staff Corps, and NACA's Chairman to act against a prototype program for probe-type planes. This legislation was introduced by Johnson at the request of the National Association of State Aviation Officials.

■ **Only Chance.** The \$12.5-million testing program is the only proposal given

a screen chance for Congressional approval at this session. But even it will have to break the opposition of Sen. John Williams (R., Del.), a member of the Senate Commerce committee. "It looks to me like a wedge to open the federal treasury to wholesale introduction of the airlines, indirectly by financing equipment costs," Williams stated. (In 1948, Williams successfully blocked Senate approval of the House-approved Brewster-Elmhurst bill.)

Meanwhile, Military Air Transport Service's commander, Maj. Gen. Lawrence Kuter, called on Congress to take definite action at this session either to create a bill or, at least, to accept the proposition of government assistance for commercial plane development. "Unquestionably, that has provided over the past three years. Kuter said, no competing program, developing surfaces from past shipping and manufacturing from meeting forward on their own."

Kuter and "The manufacturing industry and the operators have not invented their own funds... while the government of federal funds has been given only consideration. As long as federal funds are in the offing, I believe that it is essential to expect any single Airmail membership to risk his private funds on projects."



GRINWALD FOG-Martin's 2-0-2 test plane will be transformed into the first 4-0-4.

Martin Shaping 4-0-4 Sales Effort

Long-range plan developing; first, certification of 2-0-2 successor and deliveries next spring; then, a turboprop.

By Alexander McBurney

Baltimore—Glenn L. Martin Co. intends to have a turboprop-powered 4-0-4 to sell when that type of powerplant is proven for service use and the aircraft are ready to fly. That time looks to be three to five years away. But long before then—probably in the middle of next year—Martin will have a turboprop 4-0-4 flying experimentally.

"Meanwhile," Martin President C. C. Pearson told Aviation Week in an in-

terview, "intention. The turbo-engine 4-0-4 makes business in the \$15-million range to study some turboprop power plant transport needs."

■ **Sales Campaigns.**—Eager to add more 4-0-4 airline business to the \$15 million order already received from Eastern Air Lines and Trans World Airlines, the Martin company is preparing an intensive sales effort to get it. Potential customers are such companies as United, Braniff, Chicago & Southern, and designated as 7-0-00 (NATION-

west, OK time, only Northwest, using Martin 2-0-2 compressed turbo-propellers in the present 4-0-4—has any particular long-range transport equipment.

"Now that we have the big basic 65 plane order," Pearson explained, "we can handle a lot of other plane orders, even small ones, on an attractive price basis that we could not have touched otherwise."

■ **Turboprop.**—Out at San Diego, Calif., closed until the turboprop transport field, in getting Allison 38 turboprop engines, rated at 2700 horsepower, into a cargo version, Consolidated Vultee Aircraft Corp. is working on a first test. It will come in a first test, but the Allison engines and new design three-blade Aeromarine propellers. Originally scheduled for first flight in June, the turboprop, as General has called it, probably will not get into the air until July.

But the Martin company is counting on Allison's help to make the engineering data concerning the first Allison turboprop transport turboprop available primarily to any other interested manufacturers.

■ **Other Tests.**—The Martin schedule calls for preparation of a 4-0-4 to be completed for turboprop certification and flight test, as soon as two other main, moving flight test programs are completed.

The first of the testing program is to get the Martin 2-0-2 certified at a new gross weight of 42,700 lb. as compared to the original CAA-approved figure of 35,000 lb. The order is to get CAA certification for the 4-0-4.

The 2-0-2 test jet version is the company will get a 50-hp motor to develop its design to 4-0-4 proportion, and

after modifications to make his transition to the 4-0-4 specification. This is the first step in getting CAA certification for the 4-0-4.

Shortly after the delivery of the first of the certified 4-0-4 test jet, the scope of development of the turbo-prop 4-0-4 is to be stepped up.

■ **1908 hp—Charger** engine for its cells, modifications are expected to be made in the turboprop installation, since the 4-0-4 is designed from the beginning to take the greater strains of higher turboprop power. (Allison 38 is expected to be developed to as high as 3400 horsepower shaft hp. In the near future it is probable for airline use, first time in 1950, after the first flight date of the turboprop.)

Another major step in the 4-0-4 program is taken last week, when contracts for procurement of the 4-0-4 will be let to Allison after a complete test which involved the Ford-40 Straker system and Hamilton Straker design of United Aircraft, making its first test for presentation business.

■ **Allison System-A complete.** As first test, Allison for each plane will weigh approximately 168 lb. Compared with the Allison 38, the Allison will operate on the right engine of the plane with a two-speed drive for ground cruising at low speed (1000 cfm gas) and at normal cruising, and a planetary system is designed to transmit constant compression, regardless of engine speed. Design is to a specification for maintaining altitude constant when power is cut while plane is on the ground and left constant, it is supposed to permit landing and its loading of passengers.

Calvin supercharger will couple directly to engine accessory, but weighs 62 lb. and requires 50-hp compression air per min. Reduced-rated engine,

based on a new Allison development. Turbine, refrigeration, oil, valve pressure and electric controls are similar to other Allison piston-aircraft equipment developed by Allison.

■ **Press Controls.**—Automatic cabin altitude and temperature control is to be used to set 10,000-ft altitude. Sea level conditions will be maintained up to 7000 ft and a safe, comfortable descent between cabin pressure and outside pressure will be maintained up to the maximum operating altitude. Pilot will be able to pre-set cabin altitude and rate of change while plane is on the ground as system will automatically follow the preset plan in flight. Completion of the Allison deliveries is scheduled within 1951.

The Allison system was selected after a combined engineering conference between Allison, Ford and TWA on competing systems.

■ **Final Assembly.**—Work, engineering department of Martin is working at high speed finalizing design details and engineering drawings of the 4-0-4 for production. The 2-0-2, which was to be based on TWA, was in a final assembly line in the factory being assembled.

There will be formed at the 42,700 lb. gross weight. Ballast and schedule calls for the first to leave the plant in finished state June 15, with delivery after flight test possibly only in July.

■ **Three Speed.**—When testing engine units, tests completed with TWA, Martin had three engines mounted and a fourth turbine, ready to test at low and at medium speed. The test of the turbine was in sub-assemblies, tests to start on down the line.

Inspection of the 2-0-2 last week showed it was running smoothly, with



ALL-WEATHER F-95A INTERCEPTOR

First flight plans of North American F-95A all-weather interceptor shown today by the North American F-95A. Side from which it was developed, F-95A, engine, was designated as 7-0-00 (NATION-

WEST June 21. Designed for high altitude, short range interception, F-95A is powered with a GE-1-47 jet engine rated at 3100-hp thrust with an altitude engine, which burns power approximately 90 per

cent more for short bursts of speed. Time laps is 41 ft. long, and wingspan is 36 ft. Nine miles away at noon, and an inlet that inlet of its top intake engine, main engine speed for short range interception.



Photo courtesy of Transborder Air, Inc.

A Good Sign to Fly to...

As the principal airport serving Madrid, Iberia is fully equipped to accommodate international airlines of all types and sizes. Esso Aviation Products and services are regularly asked on here as elsewhere along the airways of the world. Constant research and development on Esso Aviation Products keep pace and even anticipate the constantly changing requirements of modern aviation. The Esso winged oval symbolizes products of uniform, controlled quality backed by more than 40 years of aviation experience.

*All Iberia Airport and throughout Spain: the marketer of Esso Aviation Products is Shellchem Oil Company of Spain, S.A.



ESSO EXPORT CORPORATION, AVIATION DEPARTMENT, 25 BROAD STREET, NEW YORK 4, N.Y.

AERONAUTICAL ENGINEERING



LOWEST COST PRICE with duct, and in view of exhaust stack wall (left), showed that simulation of turbine and/or engine air flow movement (see below). Right: Three aluminum alloy bearings in engine support structure (upper right) failed within



30 sec. after take off for engine. Engine would have been lost if not for two shrouds and emergency support cables. Damage to engine section also would indicate that fire in engine could be put out only by carrying extremely large amount of extinguisher



FIREPROOF CONNECTOR for ballast after fire test. Newly developed fitting, usually stainless steel and titanium, successfully withstood severe 2000 F. gasifier fire for 15 min. Right: Five specimens before and after being subjected to external fire, such as



fire occur in various system, which can attain 1400-1500 F. temperature. These 1 withstood fire for approximately 15 min.; hose 2, for about 5 min.; Hose 3 remained intact; 4 fractured; and 5 (shown dark) withstood test fire for 15 min. without damage.

How You Can Cut Aircraft Fire Danger

By H. L. Hensberry*

The best method for preventing air craft fires is to eliminate the flammable fluids involved. Work toward that end is being carried forward by many groups in both the industry and Government. Considerable progress has been made in the development of safer by-

products fluids. Some progress is being made in the development of safer engine lubricants. The more fact that several people in the aircraft industry are looking seriously at the use of gasoline deaerators as a degree of progress even along that line.

Then, we have some reason to be optimistic about any long range rule of aircraft fire safety. However, we still must live with the place of today and probably with several decades we have not yet seen, but which will go into service before our long range projects

are completed. Until that time, we should take whatever steps are possible to improve aircraft fire safety.

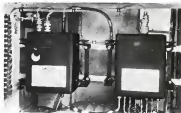
Many of these steps have been demonstrated in the Civil Aeronautics Administration's test program being conducted at Indianapolis. They are not listed here as they apply to new aircraft, but many of them can be applied to improving existing aircraft as well.

Flight Fires

*Fireproofing—As the usual pre-flight is a major source of flight fire, it will be given first consideration.



VOLUNTARY DETECTOR: "Pneum" detector is best vehicle type photoelectric cell which can sense carbon monoxide discharged in fire zone. Used in transit with regulator and alarm test switch. Sensitive diaphragm against infrared light condenser by LED action of the light wavelength characteristic of flame. Developed in lab of Photovolt, Inc., Dover is marketed by Flare Corp., Cambridge, Mass.



CO DETECTOR: Device detects fire by measuring carbon monoxide concentration. Analyzes (left) detection amount of CO in air samples (right) compartment left to it by multiple sampling valve (right). This valve isolates air from the different locations individually as three sensors in analyzer. When CO in sample exceeds specified concentration, signal circuit is completed. Maker is Mine Safety Appliances Co., Pittsburgh.



SMOKE DETECTOR: Unit operates on the principle of light reflection from smoke particles. Projective lamp directs light beam parallel to surface of photoelectric detecting cell. Carbon's black, sootier particles could amount of light to prevent reflecting photoelectric cell. When smoke enters cabinet, particles reflect light to detecting cell which generates current to initiate alarm circuit which lighting indicating light or sounding alarm. Device is available in two models: conventional type (shown) and laser type. Maker is G.D. Fire Film Equipment Co., Newark, N. J.

Prevention:

• The engine exhaust system, one of the most serious fire ignition sources, should be located as high as the engine installation is possible. The tailpipe should be located above the wing.

• A ground source of ignition, the electrical system, should be located as high as possible in the engine installation (both the electrical and exhaust systems should be so located in order of) leading flammable fluids should be kept away from the ignition sources rather than toward them.

• In order to complicate this arrangement, oil, fuel, oil, and hydraulic systems should be so located as possible and should be located as low as the installation is possible. Petroleum oils should be given to properly locating the various tanks included in these systems.

• Before fire damage and restriction should be provided, such that even large leaks can be rapidly drained away and no dangerous concentrations of flammable vapors can accumulate.

• Internal surfaces of the pre-payload cooling should be so located and clean as the external surfaces to prevent accumulation of flammable liquids and vapors.

• The collecting, slowing down, and landing of air force can be extremely dangerous when fuel air is combined with flammable vapors. Every effort should be made to ensure that air to be so processed is free of these vapors.

• All air intake and exhaust outlets located in the leading edge of the powerplant.

• All air outlets should be located as far aft as possible.

• All drains, vents, and air outlets should be piped to a common low-pressure area as far aft as possible on the airplane.

• In no instance should any discharge port for air, vent line or drain be located where the discharge can enter or impinge on any other part of the airplane.

• The exhaust system should be separated from Zones 2 and 3 by a double seal should ensure a satisfactory air flow. Tests in the laboratory should be so designed that there is no direct contact possible with the exhaust system.

• Engines should not be used for providing ventilation for the exhaust system as they have been proved to be dangerous due to the turbulence created. Smooth flow of air over the exhaust system have proved safe even with flammable vapor present. Turbulent air, in combination with flammable vapors and hot metal, is a very dangerous condition.

• Consideration should be given to the use of cooled engine exhaust gases for venting closed areas, such as 2 and 3. Reference is made here to the work done by General Armstrong Laboratory under contract to the Navy.

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VACUUM DETECTION. Visual type vacuum detector is intended to provide indication of air flow from components. No light is visible through any of four view ports unless smoke is present in housing to reflect light. Flasher (can be cut off) gives more sensitivity and better warning. Intensity of indicator light meeting the contact is adjustable for pilot's convenience. Motor & Waler Model 4 Co., Baltimore, N. J.

- All vacuum pumps should incorporate flexible plugs to prevent fire ignition within the vacuum system. The purpose of the plug is that of a fuse for emergency use only and not as a substitute for a poorly designed vacuum system. The flexible plugs should be removed from any other part of the system, as a true of the other flame-retardant fire doors.

Componentization

- It is often to confuse fans to the main- of volume, all areas should be tightly bolted from each other.
- Materials suitable for this purpose include stainless steel, Monel, Inconel, and titanium.
- It is essential that frequent materials should be used in the basic structure of the powerplant, in the cooling and flow of the powerplant. Welded steel tube nozzle structures and engine support have proved to be extremely fire-resistant.

- The entire nozzle should be constructed of fireproof metal, as well as wing skin in vicinity of nozzle.
- Steel braked fittings should be incorporated both in the tubing and directed system which pass through the bulkheads.
- Fire-resistant flexible joints between bulkheads and cooling structure at different frequencies should make use of Dow Corning Silastic N-1740 or equivalent.

- Fireproof mesh should be used for all holding systems, ducts carrying flow of air and/or flammable vapors, tank supports, straps, and brackets.

- Flexible metal hoses have proved to be fireproof and should be used wherever practicable throughout the powerplant.

- Shield valves should be incorporated in all flammable fluid systems for

fireproof at the firewall and/or at the tank outlets.

- Insulation should be provided to prevent the spread of heat through bulkheads, as well as the spread of flame.

- Hoses and electrical conductors should be non-flaming and non-sparking.

- Great care must be given to the amount of ventilation and drainage provided. Too little of either can result in an explosive condition capable of destroying bulkheads or cooling.

- Explosive-proof electrical equipment should be used in any location which could possibly be subjected to flammable vapors.

- Individual points of hazardous equipment should be completely isolated by fireproof metal and properly vented and drained.

Detection

- Two separate types of fire detecting equipment are the volume detector and the continuous detector, both of which are presently coming into the light but stage. The volume detector can best be described as a photo electric cell capable of detecting fire in a relatively large volume. The continuous detector is one which is capable of detecting heat applied to a sensitive element.

- Present state type fire detection must be used to best advantage at present. Such detection should be closely spaced throughout the cooling air ducts from Zones 1, 2, and 3 and should be located at the top and along the sides of zones carrying little air flow, as well as in the vicinity of any obvious fire hazards.

- Supplementary systems should be incorporated, such that the fire detecting system can be completely dependent on light.

- Each powerplant installation should incorporate an individual fire detecting system. It is necessary to provide a

divided system for each zone of any powerplant. It is suggested that detector operation should, in addition to warning the pilot, act as the necessary warning for the discharge of extinguishing agent to the proper powerplant.

Extinguishment

- Carbon dioxide should be eliminated from use in aircraft powerplants.

- CB or perfluoro methyl bromide should be used in all power plants.

- The intensity of the better fire extinguishing agents should be determined. Personnel should not be required to use extinguishing agent at any time and, so long as the problem is one of fire hazard, the best fire extinguishing agent should be used.

- All zones of aircraft powerplants should be protected by a properly designed extinguishing system, including Zone 1.

- Discharge of extinguishing agents to all zones in any powerplant should be simultaneous and fire the same duration.

- The quality, rate, and duration of extinguishing agent discharge under all flight conditions should be carefully supervised.

- Engine shutdown and the stopping of all flammable fluid flows in aircraft engine shutdowns in their own elements for fuel and allow the fire to burn out.

- Fans in all areas can be extinguished with or without engine shutdown.

- The present position of testing in beginning agent containers within the findings is undesirable. The necessary long lead times make very difficult the provision of adequate agent discharge rate. Such a system speeds each of its weight for plumbing rather than extinguishing agent, and it does not lend itself to good design fire protection. It is suggested that in low-temperature aircraft a two-stage system be located in each wing with the shutoff possible from in each engine in each wing or that a single stage system be installed within each nacelle with remote-located the nacelle in each wing.

- Engine Components—Recently, the possibilities of bigger components of fire have been very much emphasized. In this connection, the following stage should be taken in an effort to combat such fires.

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stratum of one alloy for another calls for a thorough investigation of materials. The initial step is to determine the operating conditions of the component in question. The need for investigation is to give a complete picture of operating stress levels and temperature of parts, Polson says, "can not be over emphasized, for it is only with complete knowledge of the engine that successful substitution may be selected."

Not only a knowledge of engine details such as temperatures and stress is called for, but also temperature gradients, thermal shock conditions, vibration and other positive or "off design" engine operating characteristics.

Knowledge of these factors is a particular engine design will increase with development but time and the expense involved in the field on engine test mounds. With as much of the information as possible on the engine part under consideration, a substitute material can be selected with more degree of confidence, he believes.

► **Selecting Substitutes**—Knowing operating temperatures, stresses and other component factors, Polson says a quick survey of critical index charts for alloys (Fig. 1) will provide some leads for the selection of a substitute. Thus, consider selection of a substitute for N155 stainless steel sheet reference to the alloy index charts reveals several possible substitutes. The index numbers for Type 316, Type 316L, Inconel, W18Cr4V, and Type 314 stainless steel indicate possibilities for a change in the use of strategic material if the required physical and mechanical properties for the component part "meet life" are met.

Polson points out that some engine substitution should be given to use of materials having higher index numbers if it is possible to increase the life of an engine part. In the event that some flying hours per gallon of critical element are shown, that, in general, the approach should be to achieve required engine life with material of lower critical element content.

From the engine data and component parts he says it may be possible to strip completely out of the high temperature materials field and come up with a replacement use extensively low in strategic content or with an alloy that completely eliminates the use of the critical elements.

► **Redesign** Parts—In most instances consideration of the physical and mechanical properties of substitutes is concerned with direct material substitution in the rapid design as they are a function of a substitute coupled with a redesign of the part.

Polson holds that this question often is decided by the lack of low

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stronger materials with adequate mechanical and physical properties, necessitating redesign of the part to ease the operating conditions. Redesign must usually provide for lower stresses (often steady state or subcritical) and cooling in air flow, or some other means of easing operating temperature conditions.

Mechanical properties to be considered in selecting a substitute material are the same as those in the selection of a material for the initial design. Properties such as creep, stress rupture, fatigue strength, short-time tensile and yield strength and corrosion characteristics (particularly where the elimination of some or all of the critical elements are considered) must be taken into account. Properties such as thermal conductivity, coefficient of expansion, modulus of elasticity and density must be considered and properly evaluated.

After mechanical and physical properties of substitute materials have been considered, the problem of manufacturing must be solved. Processing variables such as formability, machinability, weldability and coating properties are extremely important in the development of a successful replacement alloy.

It is important to remember that successful development of an engine low in strategic material content or one that provides a decrease in strategic element use should result in an over-

all decrease in cost per horsepower flying hour.

■ **Substitute Engines**—With the foregoing details of substitute material selection in mind and with the given load torque (Table I) as the basis of initial design for a starting point, a probably adequate substitute engine can be established (Table II).

The term "probably adequate" must be used to indicate the lack of the necessary but not manufacturing data to prove out the material selection. Pedersen maintains that experience along these lines must be obtained in the early phases of the manufacture of parts for test and from an exhaustive engine proof test program. Figures in Table II can serve only as a preliminary estimate.

It is believed some decrease in engine life and performance would be experienced with this engine, but the overall use of strategic materials would be greatly reduced.

According to Pedersen, even in practical turboprops which have no strategic material limitations, the critical outlay of critical materials for these can be substantially reduced by:

- Increasing engine life to that planned requirements in order of turboprop engines are lowered.
- Cutting weight ratio of static new engine versus strategic finished material.
- Reducing weight of engine parts.

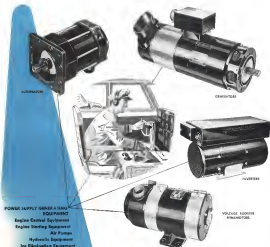
No Lacquer Needed

American Airlines has found in the results of one year's service test on a DC-3, that the zinc chromate primer and aluminum Dural 1274 motor engine case lacquer finish (originally applied by Douglas on the exterior surfaces of the wing center section) is unnecessary. Replacing these with an acid engine change revealed considerable savings.

On the test plane, the sections in question were stripped down and examined frequently for corrosion. Only incipient surface corrosion was observed and this could be easily removed by the application of Alcoa No. 1000 #9, Type 5008 Liquid Polish. On the basis of this service test, the paint was removed entirely from the engine section. Alclad surfaces on the remainder of AA's fleet, the flap gap area and wing section skin were left in the painted condition.

Airfoam Upholstery

Airlines using airfoam find it an excellent upholstery medium, judging from opinions heard at the recent ATA Engineering and Maintenance Conference at Kansas City. Although the initial cost is high, it requires no maintenance thru conventional spring arrangements.



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WHAT ABOUT THE OTHER FELLOW?

But! What about the people who work for you? The man in the shop . . . your own secretary . . . the fellow in the shipping room. Do they know all this about the Census? Chances are some of them do, so the idea is to get the right information across to those who don't!

WHAT'S THE BEST WAY?

If it's possible, tell everyone together and talk about it . . . ask questions . . . exchange ideas. If your outfit is

too big for that, direct a Census Information memorandum to all your employees. First information on the bulletin boards. Run a Census story in the company house organ. Talk about it. Every way you can . . . get the people who work for you to cooperate with the Census.

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Improved Hiller 360s on Market

Executive model has specially polarized canopy and completely insulated and sound-proofed cabin.

Hiller Helicopters this year is marketing two versions of the Model 360—a utility and a "plush" executive version. Numerous improvements have been made on the 1953 line, including higher performance and increased useful load.

The Plush, Alto, Chief, Insider has already started deliveries, and prices are announced at \$21,495 for the utility craft and \$23,975 for the executive model. (Price of the former Hiller model was \$19,995.) Deliveries are being made in 90 days.

Improved Features—The 175-hp Pratt & Whitney engine has been modified to develop 182 hp. The extra power plus some redesign has produced an increase in the rotor's gross weight to 2400 lb. and added the utility model's useful load from 615 lb. to 965 lb. In spite of these weight increases, performance has been better. Maximum cruising speed is listed as 64 mph, normal cruising speed 52 mph, range 200 mi., vertical rate of climb 400 ft./sec., maximum climb 560 ft./sec., service ceiling 10,000 ft.

Some of the other detail improvements include: Redesign of the rotor system, giving better efficiency and flight characteristics; use of vibration and control cables throughout for increased longevity and easier maintenance; improved heavy-duty and longer-wearing recovery attached skids, strengthened tail boom bearing mounting which provide vibration between controls and air in corrosion control, modified carburetor air intake, flexible controls have been reworked throughout, collective balance and automatic fuel pressure system have been made standard.

Executive Highlights—Custom appointments in the executive version include: Specially polarized canopy, completely insulated and sound-proofed cabin, combustion engine heater in windshield defogger, night flying installation including position lights, turn landing lights and fuel assembly; enlarged instrument panel; better flexible PATR 184 radar transceiver, 10 ft. compass, sensitive altimeter, magnetic pressure gauge, and indirect controlled instrument lighting in addition to standard environmental.

BRIEFING FOR DEALERS AND DISTRIBUTORS

LINE SERVICE FATS OFF—Since Nov. 8, H. A. Moore of Florence (N. C.) Aviation Service, and Atlantic Golden Park have been patrolling some 400 mi. of back terrain near the Cape Fear River in light of Raleigh, thus highlighting another effective and steady income source available to most other airport service agencies. Moore and Park cover 75 mi. of route in three hours using a Piper Cub—a job which takes an airplane crew about three days. In case a law repair is needed locally,

information can be added to help them the plane, just waiting until law enforcement is dispatched from the nearest point.

AIRBORNE GROWTH—Aviation Dynamics Corp.'s second annual convention in Los Angeles pointed up rapid growth of "workover" organizations in little more than a year—from an idea for lowering maintenance costs to a well-kept group comprising 20 workshops which are started throughout the U. S. and Canada.

AIRPORT HOUSEKEEPING—Rattling into soft ground, dusts, snow, etc., melted second in a row of 180 landing accidents studied by Flight Safety Foundation, Inc., and points up need for the airport manager to insist on daily inspection of landing area and ramps and adequate marking of danger areas. Oversteering and run-downs are most responsible for a large number of mishaps. Many come with the still, with collision resulting. Average cost per landing accident was \$11.

REICH SERVICE ABROAD—Aircraft service engineering shops are now engaged in an international program of free cooperation of resources, extending to Europe and South America. The program launched earlier this year in the U. S.

SCHOOLING GUIDES—Two texts of interest to operators having pilots and mechanics to bring course up to 1970 editions of "Civil Air Regulations & Airman's Guide for Pilots" and "Civil Air Regulations & Reference Guide for AAE Mechanics," published by Aero Publishers, Inc., 2153 Sunset Blvd., Los Angeles 26, Calif. Large type and two-volume making is used. All the latest regulations revisions are combined. Paragraphs and sections are numbered according to the Government's new system. Operators are allowed limited discounts on the last pages of \$1.95 and \$1.75 respectively per copy.

INSECT CONTROL DATA—Data system planning to operate in Wisconsin this year can obtain copies of a report, "Current Control Recommendations for Wisconsin in 1950," by the University of Wisconsin, Extension Service College of Agriculture, Madison, and asking for contact 257. The cost is free.

HANDY AIRSTRIPS—Construction on Cedar Rapids Area in Tappan County, Iowa, is making good use of two airstrips temporarily located and used to the point for expediting close contact. The strips are regularly used by night planes in addition to those flown in by lighters. One strip is 3600 ft. by 150 ft., the other 2250 ft. by 150 ft. A permanent landing field is being prepared close to cleared agricultural business at the day.



FINANCIAL

Aircraft Value 'Yardsticks' Vary

Dividend policies and "normal" earning power shape market prices; book value has little effect.

Comparative Market Ratios

Listed Aircraft Equities

	Book value \$100 (Per Common Share)	Market price April 15, 1959	Percent market price to book value	1949 earnings per common share*	Market price earnings ratio*
Bell	104.02	89.58	86.2%	10.28	5.5
Boeing	56.82	74.75	131.6%	9.47	32.4
Boeing-Cum Vols.	42.77	26.79	62.9%	5.07	7.9
Boeing-Flight (common)	13.22	14.25	107.8%	1.80	5.5
Boeing-Flight (preferred)	123.66	88.00	71.6%	9.12	7.9
Boeing-Flight (convertible)	7.94	3.89	49.0%	0.68	5.5
Boeing-Flight (convertible)	27.04	26.38	97.6%	3.75	4.4
Boeing-Flight (convertible)	40.49	20.58	50.8%	5.19	5.6
Boeing-Flight (convertible)	17.26	15.15	87.8%	4.01	5.5
Boeing-Flight (convertible)	10.94	12.98	118.6%	2.12	5.6
Boeing-Flight (convertible)	8.58	7.63	88.9%	0.87	6.1
Boeing-Flight (convertible)	11.24	5.75	51.2%	0.94	6.1
United Aircraft	37.88	20.25	53.5%	9.31	5.5

* Not adjusted for non-recurring income or charges.

In evaluating individual equities, investors frequently employ various yardsticks to measure relative market values. It is these measurements of different equities which make the market and furnish prevailing levels of quotations. The aircraft group subject to this process every day in the marketplace has developed a pattern of its own.

Book Value Fiasco—One of the great misconceptions to many investors is why a number of aircraft equities not only trade at substantial discounts to their book value but are frequently available at national discounts from their net working capital. The above table lists the most significant market ratios for the major listed aircraft common stocks.

It can be seen that Bell, for example, is now available at 86 percent of its net working capital. Bell sold at slightly more than one-half of its net working capital only last year. Only Grumman approached its book value and Consolidated was the least exception selling at a premium above its net working capital.

When one of these companies is on the verge of effecting a complete liquidation, book values would have great significance as far as market evaluations are concerned. But such is not the case.

Even as such instances as Douglas, where net working capital alone ap-

proach almost \$100 a share and the market price is now around 50 percent of such current accounts, the discount is only of academic value. There is always the possibility, upon liquidation, that current working capital may be less than the value of the assets of the company.

Earning Power is Key—The main criterion for long-term and non-recurring power. The market is in no way a guide to distinguish between "normal" earning power and that of the non-normal variety. For example, Martin shows the lowest market price-earnings ratio of 3.1 times. Actually, however, almost half of the company's 1949 reported earnings represented extraordinary adjustments in extraordinary earnings from normal manufacturing activities. Allowing for such distortions, it is reasonable how item in the range of market price-earnings ratio for normal earning power as reported during 1949 is for most aircraft equities.

The fiasco of the extremely high ratios for Boeing Wright and Bell are only explicable. Boeing Wright, currently selling at 73.9 times its 1949 earnings, is a special situation where dividend policy has led to relationship to current profitability. In other words,

\$1.08 was paid per share last year and 25 cents, then for during 1950 out of accumulated earnings of prior years. Bell, recently commencing a similar price-earnings ratio of 10.4 times, paid \$1.08 per share during 1949 while only earning 47 cents. Here, too, dividend policy made possible high accumulated earnings of past periods in the absence of current earnings.

Standards Vary—A lesser accepted market price-earnings ratio was around 10 times. However, this measure has long lost its character of uniformity and it has been reduced to meet the enthusiasm of the times. Each major stock group has its own standard. For quality, the less criteria and more data on the earning power of a company, the lower the price-earnings ratio.

Allowing for adjustments due to non-recurring income or charges, Douglas, United Aircraft, and Grumman appear to enjoy the highest current market quotations in the marketplace.

The next group enjoying a high rate of investment capital appear to be Boeing, Boeing Wright and Lockheed.

Dividend Policies—A very important consideration which now through an inherent judgment in dividend policies of the separate companies, assuming sustained earnings growth and a high rate of dividend payments has been established. The market quotations, in fact, quantify past performance in a yield basis.

For example, there is no doubt that the \$2.00 annual rate paid last year by Grumman, Lockheed and United Aircraft is a major factor in accounting for the premium of market quotations for all these aircraft equities. In this instance, the average yield is better than 7.1 percent.

An established policy toward regular dividend distributions is likely to be a factor in importance in obtaining a valuable investment status for any equity. It must be remembered that the aircraft industry must seek outside capital raising from time to time. Therefore, companies which are benefited by long-term earnings and dividends pay per share a broad list of attractive investment, safety and even reduced securities. Many of these other companies concerned more with earnings and have less uncertainties than present among aircraft assets.

It is a serious mistake to assume that the accompanying market price-earnings ratios are static and self-explanatory to their current picture. Individually, the marketplace is a dynamic arena involving and specializing alike in the evaluation of the continuing prospects of the separate companies with perceptions of likely 1950 earnings. In these evaluations, constantly taking place, which will influence the course of aircraft equity prices and set the course for an eco-changing pattern of relative standards. —Selig Altschul

Need precision parts for definite requirements?

LET KOHLER HELP YOU DEVELOP THEM

Many integral and precision products in the extensive Kohler line are designed and produced in close cooperation with the aircraft industry for specific requirements. Shown are a few of the valves and fittings developed for latest turbojet engines.

What parts do you need for special applications? Do your specifications call for a complex fuel or hydraulic valve, a high pressure swing check valve, a fuel dump valve? Whatever the

need, we will help you with your problem. Experienced and skilled machine operators, complete manufacturing facilities centered in one plant, and exacting methods of testing and inspection, ensure uniform high quality and prompt, accurate deliveries.

Send your specifications or requirements for valves or fittings for aircraft, automotive or industrial applications to Kohler Co., Dept. 16-U, Kohler, Wisconsin.

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Air Leak Detector

(McGraw-Hill World News)

A new vapor sensitive detector which gives both audible and visible signals of leaks in air pressure lines, is now being marketed by the **Smith-Thomson-Hudson Co., Ltd., Roanoke, England**.

Engineers consider especially of a detector used in control lines. Detector is a hand-held probe with a piezoelectric sounder. It consists of a diaphragm sensitive to vapors of halogen compounds and a motor driven amplifier which draws air through the element.

When checkup for air leaks, a tell-tale "traced gas" is injected into the system so that any air escaping will carry a small percentage of the "tracer" which will be picked up by the detector.

A small loudspeaker built into the instrument sends an audible clicking sound. The frequency of the clicking increases when the detector picks up a leak. A visual indication is given by an increase in the action reading on the control unit.

The tracer used is T.C.D. Acetylene. This gas reportedly has no bad effects on components, is non-toxic, odorless, and can be liquefied at approximately 70 psi. It can be vaporized into no pressure system with most cylinders containing 1 to 2 oz. of liquid.

Instrument can detect leaks penetrating at the rate of one mm. with a tracer concentration of less than 1 percent. In terms of air pressure system having a total capacity of 300 to 400 cu. in. and operating at 1000 psi, this corresponds to a full in. leakage of 2 psi in 24 hr. from any one leak.

Avionic Thermostats

Line of bimetal disk and bimetal strip thermostats made by **Sterens Mfg. Co., Inc., 69 S. Wabash St., Newfield, Ohio**, are bimetallically sealed to corrosion-resistant metal enclosures and are used to be specially designed for engine equipment subjected to dust, moisture or corrosive vapors. Permanent sealing prevents infusing and distor-

tion of silver contacts. Operating in areas from -60 to 60°F.

Enclosures are sweat-soldered into metal tubes intersealed with an organic glass sealant held in place. Units feature electrically independent bimetal thermal control elements that eliminate without cycling or "hysteresis." Comparative performance curves and specifications are available on request.

Cleans Carburetors

For superior, more thorough cleaning of high pressure carburetors and intake manifolds, **Exxon Mfg. Co., 1107 S. Fairview St., Alhambra, Calif.,** announces Exsol 10.

Makes (three) prevent removes harmful gasoline gum without need for removing, disassembling and "baking" out the carburetor. And it "does this job thoroughly and effectively in 15 to 20 min."

Company says it is available and independent testing laboratory in California has substantiated a recent statement that use of Exsol 10 resulted in 15 to 20 percent increase in horsepower and higher fuel economy.



Sealed Timers

New timers, "adaptable to any application involving constant time-lapse or high frequency" (action) used in aviation," are sold by **A. W. Hayden Co., Waterbury, Conn.**

Timers are claimed to be specially suited for military use. They are constructed in hermetically sealed enclosures to give maximum protection against fumes, growth, oil spray, humidity, oil spray, sand and dust, explosive atmospheres and climatic changes.

Enclosures are constructed to 300 atmospheres and filled to one atmosphere with dry nitrogen so that full switch ratings can be used at extremely high altitudes. Detonation of nearby bombs is said to be completely eliminated.



New Spark Plug

A new type of serrated torque spark plug, whose "self-cleaning" design diffuses gasoline from other plugs currently on the market, has been announced by **Irvin H. Doherty**, president of **Irvin Avionics Products, Inc., 2635 N. Shattuck Ave., Philadelphia 33, Pa.**

The unit, designated the Irvin Model 15791, incorporates an "electronically" mounted variable-over-voltage solenoid design was originally patented by Lewis Irvin in 1924. Since that date, constant development resulted in the first experimental model built in 1941. "Bugs" were progressively eliminated and the plug was first installed in a commercial airplane in 1947. It has been approved by the CAA.

An interesting feature of the Irvin plug is the self-cleaning action afforded by the outer electrode. This is achieved by providing a chamber directly behind the two electrodes into which the mixture is forced by the compression stroke. When the explosion occurs, this mixture also ignites and cleans the outer electrode as the gases recede into the combustion chamber. The net result is an "initial" not only and is of simple construction, consisting essentially of an outer shell, a two-component heat-dissipating copper ferrule, and a specially developed ceramic insulator mounted to the outer electrode with a new type of non-hardening adhesive.

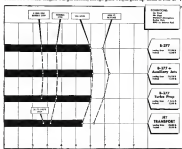
Elimination of dirty materials and use of specially self-cleaning plug competitive with the best expensive currently available units, the manufacturer claims. It is said to be suitable for installation in all model engines from the R1520 to the R1570. Laboratory tests indicate that the Irvin plug has averaged 305 ft. LIMEP.

Capital Airlines demonstrated this spark plug two years ago and obtained a high 4170 hours milestone before failure. The engine manufacturer's 2800 man-plane which are in the process of being evaluated at this time. Colonel Adams and the Navy are also interested, the manufacturer says.

AIR TRANSPORT



McGraw-Hill predicts growth will get steeper, though gross weight goes up. Some is true of it.



LANDING FIELD lengths, shown in thousands of feet, in various countries.

Future's Planes vs. Today's Fields

Plans for new transports—outstrip present airports, but engineers feel they can tailor planes to fit.

Airport limitations at many important U. S. cities have brought decision of tomorrow's transports down to earth. In many respects, airports for commercial aircraft of the future seem far ahead of plans for getting the day in and off the ground and moving it while at the terminal. But engineers are con-

vinced they can tailor jet and turbo-prop transports to the capacities of the airports which will have to handle them in the future.

D. A. Black, sales engineer for Boeing Airplane Co., explained that point of view in a recent paper delivered before the third annual meeting of the Airport Operators Council in Cleveland. To illustrate, he cited the proposed airport development of the Statehouse (Aviation News, May 1).

► **Runway Needs**—At the Statehouse's power and gross weight are increased through addition of auxiliary jet ports and later by use of turbo-prop, the day will require less, rather than more field length, according to Black. And airport runway requirements can be reduced even further when the Statehouse is replaced by a port jet design. Black's conclusions are based on comparison of Civil Air Regulations takeoff field length requirements for an 18000 lb. aircraft on a standard day and at a standard airport.

The Boeing sales engineer stated, however, that the port jet is possible more than other plans by last day calculations. Under the worst conditions of ABRD (Army Hot Day) takeoff with maximum gross weight, Boeing's proposed 140,000 lb., 75-passenger port jet transport would require 9025 ft. of runway at standard and standard conditions, it would take only 3620 ft.

► **Porter Jet Better Jobs**—The jet transport described by Black would be capable of operating from 6000-ft. runways, which are available at many airports. But the Boeing official observed that a more efficient jet plane—designed to produce more than twice as low—could be built if one uses 7000-ft. runway was available at these sites.

This runway would satisfy requirements of the proposed plane under worst conditions from now to 30 years in any direction. With any crowded segment of more than 30 miles, a 1500-ft. right-angle runway would now satisfy operating requirements.

► **Charts to Show**—Boeing's proposed takeoff field lengths quoted by Black are based on deterioration rates for the acceleration and stop distances that assume the use of a moderate-sized, punch-out referred to the point where the diversion is to stop. Such charts have been tested extensively by Boeing, and the company considers them as reliable in any other testing center.

With no parallel to be reversed, Boeing feels that the chart of each chart for at least emergency use is a very desirable procedure. In actual operation, the charts can be selected prior to landing the day while keeping it inflated and off the ground when the plane is stopped.



A specially modified Hi-Shear rivet gun inserts a rivet into a hole and the gun's arm

FAST VISUAL INSPECTION with HI-SHEAR RIVETS

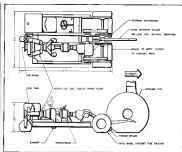
HI-SHEAR rivets are visually inspected. If the rivet is applied correctly to correct the hole is correct, if anything is wrong with the installation it can be seen. An incorrectly installed rivet is easily replaced.

Hi-Shear inspection tools and gauges are required. Torque checks are eliminated. Inspection of Hi-SHEAR permits a rapid and accurate check for good workmanship.

Other HI-SHEAR features

- HI-SHEAR design means rivets fit snug and tight.
- Reduces gaps and machining — they result in a single to clipped surface.
- Closes the work gap.
- Offers a broad range of styles and sizes.
- Reuses anvil and lighter driving equipment, service, less waste of fatigue.
- Installation speed — as HI-SHEAR is in one hit.

U.S. and foreign patents. Transport equipment



ROCKING'S TUG can ground handle jet transports to save fuel, increase payload

A single tug pushes, pulls approximately the same distance as leading-off distance as tow propulsion in kilometers.

Leading field length requirements for modern jet, prop, turboprop and turboprop aircraft are light, even requirements of the present model. This is because of the higher leading prop weight resulting from increased thrust or powerplant weight.

Yellowbug—Crewed handling and moving of commercial jet transports to the aircraft parking areas is a usual problem. But, jets might not be around 1980 in all but equal to the requirements of towing to the aircraft parking. So some other way of moving the planes seems necessary.

Boeing has developed a small self-propelled and electric tug to meet this demand. Weighing about 2600 lb, the vehicle can move a fully loaded plane 15 mph and travel at a speed of 30 mph. The tug can store and handle an aircraft plane forward or backward.

Power for the tug is a small gas turbine engine, which is a piston that has a gear to the main gear and utilize the air plane weight for traction of the wheels. The turbine power has the advantage of quick starts and full available power in cold weather, and the ability to provide a source of hot air only for the ground conditioning of the plane. And an engine is available for starting the plane's turboprop engines at end of service.

Little Room—Black, stated, that the use of jet transports should have little effect on terminal area, gateways and routes, instead, since the value pattern

is quite low. Analysis of an additional type large turbine jet and mounted at a small angle, with the center line at the nose 5 ft or above the surface, indicates that the maximum ground temperature would be about 275 deg F for sheet materials at ramp and tarmac with full power.

All terminal and taxi operations would be at the aft thrust condition, where ground temperatures would approach 350 deg.

Velocity at maximum thrust at a distance of 30 ft from the nose is 10 mph, then the plane's tail would be about 150 ft per second equal to a 750 mph and at 100 ft the velocity drops to "300"—equal to a 450-mph wind. During this time, the velocity at the 30 ft distance would be about 50 mph — or the equivalent of a 34 mph wind.

Bucks Copters for Inter-City Hauls

The supervisor is Eastern Air Lines Chief Passenger Charles Fennell, that helicopters could provide cheaper and faster short-haul inter-city travel. (Aviation Week Apr. 17) has been preceded by Chicago's M. Bellini, president of the Airport Operators Council West, Annual Meeting and Conference in Cleveland.

Before, whose helicopter service has been successfully carrying the mail for two and one-half years, added this new idea. He says helicopters are the best means of providing additional airport traffic and making the journey

of infrequent passengers more comfortable and convenient.

New Generation—He said an inter-city helicopter feeder system would generate traffic which at present does not exist. He based this prediction on the experience of his mail routes. AAAA statistics show that a great number of telephone offices, even in areas, would not be previously because its effectiveness was curtailed by loss of time in connecting with airlines at the terminal. Helicopters will generate more passenger traffic in a similar manner before and.

Play All Stops—Greater emphasis of the feeder is bringing traffic to and from terminal points. For example, one feeder makes two stops between San Francisco and Los Angeles. About 80% of its passengers are made under jet engines. And the great flood of passengers in Los Angeles began about 1970.

A feeder into a metropolitan area might service not a dozen stops, but one hundred fifty. Included would be towns and villages which have only bus transportation now. Before, he said that would bring Los Angeles airport several million additional passengers a year.

First Step—San Francisco—He said that plan for jet transports as an other good argument for helicopter inter-city travel. When jet transports bring Chicago is close to Los Angeles in San Bernardino area is, (7) miles east but 70 miles from the airport, it jet won't be produced because to fly to an airport with a long ground taxi. Connecting helicopters to the center time.

Before plan give equal consideration to the great percentage of passengers whose travel is in the ground taxi service. He hopes eventually to provide helicopter service for the same cost as two or three times more to the airport. He expects it will take longer to solve these problems under the first operations of helicopters into the center of congested areas will have to avoid multi-engine machines which do not appear forthcoming in the near future.

Lightplane Service

Ross Aviation Corp., St. Louis, in conjunction with BACA Airlines, Jefferson City, Mo., has started scheduled lightplane service between the two cities.

BACA operates a Cessna 170 on a morning nonstop flight and Ross makes an afternoon run with a Cessna 440. BACA also has a daily schedule from Jefferson City to Springfield and Kansas City, Mo. Mid Continent Airlines, the only carrier authorized into Jefferson City, is not providing service because of airport conditions.

Foreign Airline Equipment

(Transport Types Only)

Manufacturer	Model	No. in Service	No. of Engines	No. of Pass.	Country of Mfg.
Boeing	DC-3	1,983	2	36	U.S.
Boeing	DC-4	543	4	43	U.S.
Boeing	707	82	7	273	England
Boeing	720	21	2	6	England
Boeing	737	26	2	5	England
Boeing	747	22	4	43	U.S.
Boeing	747-200	40	4	43	U.S.
Boeing	747-300	34	3	31	U.S.
Boeing	747-400	50	3	11	England
Boeing	747-500	60	3	60	U.S.
Boeing	747-600	10	3	60	Canada
Boeing	747-700	50	4	31	England
Boeing	747-800	10	4	15	U.S.
Boeing	747-900	32	4	32	France
Boeing	747-1000	27	3	17	Germany
Boeing	747-1100	36	4	32	U.S.
Boeing	747-1200	34	2	6	U.S.
Boeing	747-1300	32	2	40	U.S.
Boeing	747-1400	20	2	5	England
Boeing	747-1500	24	3	18	U.S.
Boeing	747-1600	22	3	40	U.S.
Boeing	747-1700	22	3	40	England
Boeing	747-1800	20	4	33	England
Boeing	747-1900	16	2	6	England
Boeing	747-2000	18	3	34	U.S.
Boeing	747-2100	15	3	34	U.S.
Boeing	747-2200	12	4	24	England
Boeing	747-2300	12	4	24	England
Boeing	747-2400	12	4	24	England
Boeing	747-2500	11	4	22	England
Boeing	747-2600	10	2	6	Germany
Boeing	747-2700	9	2	6	England
Boeing	747-2800	8	4	32	England
Boeing	747-2900	8	4	30	U.S.
Boeing	747-3000	8	4	30	U.S.
Boeing	747-3100	8	4	30	U.S.
Boeing	747-3200	8	4	30	U.S.
Boeing	747-3300	8	4	30	U.S.
Boeing	747-3400	8	4	30	U.S.
Boeing	747-3500	8	4	30	U.S.
Boeing	747-3600	8	4	30	U.S.
Boeing	747-3700	8	4	30	U.S.
Boeing	747-3800	8	4	30	U.S.
Boeing	747-3900	8	4	30	U.S.
Boeing	747-4000	8	4	30	U.S.
Boeing	747-4100	8	4	30	U.S.
Boeing	747-4200	8	4	30	U.S.
Boeing	747-4300	8	4	30	U.S.
Boeing	747-4400	8	4	30	U.S.
Boeing	747-4500	8	4	30	U.S.
Boeing	747-4600	8	4	30	U.S.
Boeing	747-4700	8	4	30	U.S.
Boeing	747-4800	8	4	30	U.S.
Boeing	747-4900	8	4	30	U.S.
Boeing	747-5000	8	4	30	U.S.
Boeing	747-5100	8	4	30	U.S.
Boeing	747-5200	8	4	30	U.S.
Boeing	747-5300	8	4	30	U.S.
Boeing	747-5400	8	4	30	U.S.
Boeing	747-5500	8	4	30	U.S.
Boeing	747-5600	8	4	30	U.S.
Boeing	747-5700	8	4	30	U.S.
Boeing	747-5800	8	4	30	U.S.
Boeing	747-5900	8	4	30	U.S.
Boeing	747-6000	8	4	30	U.S.
Boeing	747-6100	8	4	30	U.S.
Boeing	747-6200	8	4	30	U.S.
Boeing	747-6300	8	4	30	U.S.
Boeing	747-6400	8	4	30	U.S.
Boeing	747-6500	8	4	30	U.S.
Boeing	747-6600	8	4	30	U.S.
Boeing	747-6700	8	4	30	U.S.
Boeing	747-6800	8	4	30	U.S.
Boeing	747-6900	8	4	30	U.S.
Boeing	747-7000	8	4	30	U.S.
Boeing	747-7100	8	4	30	U.S.
Boeing	747-7200	8	4	30	U.S.
Boeing	747-7300	8	4	30	U.S.
Boeing	747-7400	8	4	30	U.S.
Boeing	747-7500	8	4	30	U.S.
Boeing	747-7600	8	4	30	U.S.
Boeing	747-7700	8	4	30	U.S.
Boeing	747-7800	8	4	30	U.S.
Boeing	747-7900	8	4	30	U.S.
Boeing	747-8000	8	4	30	U.S.
Boeing	747-8100	8	4	30	U.S.
Boeing	747-8200	8	4	30	U.S.
Boeing	747-8300	8	4	30	U.S.
Boeing	747-8400	8	4	30	U.S.
Boeing	747-8500	8	4	30	U.S.
Boeing	747-8600	8	4	30	U.S.
Boeing	747-8700	8	4	30	U.S.
Boeing	747-8800	8	4	30	U.S.
Boeing	747-8900	8	4	30	U.S.
Boeing	747-9000	8	4	30	U.S.
Boeing	747-9100	8	4	30	U.S.
Boeing	747-9200	8	4	30	U.S.
Boeing	747-9300	8	4	30	U.S.
Boeing	747-9400	8	4	30	U.S.
Boeing	747-9500	8	4	30	U.S.
Boeing	747-9600	8	4	30	U.S.
Boeing	747-9700	8	4	30	U.S.
Boeing	747-9800	8	4	30	U.S.
Boeing	747-9900	8	4	30	U.S.
Boeing	747-10000	8	4	30	U.S.

As additional model numbers are added to this list, the number of aircraft in service will increase. Aircraft numbers are listed because of incomplete data.

U.S.-Built Planes Carry the Load

Despite efforts by manufacturers in other countries, 78% of world's scheduled transports are American.

The world's airlines are still largely dependent on U.S.-built transports despite intensive efforts by manufacturers in other countries to narrow the margin of American supremacy.

A nearly complete study by the Civil Aeronautics Board's Foreign Air Transport Division shows that about 78 percent of the aircraft used by scheduled airlines outside of Russia are of U.S. manufacture, 15 percent British, and 7 percent come from other countries.

In the Western Hemisphere, 92 percent of the airline transports are U.S. built and 4 percent British, while in the Eastern Hemisphere the rate is 62 percent American and 37 percent British.

Last year's study showed 77 percent of the world's airline planes were American-built and 15 percent British. Top Builder—Curtiss the 7775 planes included in the survey, 78 percent were built by five manufacturers: Douglas

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from 1/2" to 1 1/2"

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Approach Light Systems Analyzed

Civil Aeronautics Administration's slope line approach lighting system gets high marks in a report by the agency, covering analysis of eight different methods.

The slope-line technique furnishes the simplest indication of direction, the only accurate indication of altitude, and the most accurate information as to lateral position with respect to approach area regardless of attitude, according to R. E. Warren, of CAA's airport development division.

The Calvert system is credited with providing a rough estimate of altitude when two of the cross bars are seen simultaneously. And Calvert's horizontal cross bar is used to furnish the best indication of altitude. It is noted that any of the systems not giving good altitude information could be improved by adding horizontal cross bars.

Twelve studies were made of each of these techniques: Area single line, double row, double row with sidebars,



ESCALATOR FOR CYLINDERS

United Air Lines' new "push button" automatic bus at San Francisco uses this 3600 in. overhead skate conveyor for moving reconditioned cylinders. After an engine is dismantled and taken through a washing process, the reconditioned and reassembled cylinder is moved up the conveyor (driven by a 75 hp electric motor) and down by the automatic of the engine. Because of a thorough system of checks and counterchecks, no cylinder can be reassembled before an engine is dismantled and ready for testing. Parts are numbered so that in reassembly one engine will not be reassembled with another. UAL overhauled nearly 500 engines monthly at the San Francisco base.

lateral, slope line, path of flight, multi-line, and the Calvert bar system. The studies showed how each pattern would appear to the pilot from various points. Four of the studies showed enhanced visibility while the other eight contained the lights visible for 1600 ft.

The studies are described in the report, "Prospective Analysis of Approach Light Systems," technical development report No. 96, sponsored by CAA, technical development, Indianapolis, Ind.

Complete cut-off templates are included for three types of systems, and may be placed over the perspective drawings given to show the cut-off effect.

- **Slopes:** Pros and Cons—Good points and faults of the various systems are analyzed briefly.
- **Direction:** Double row with sidebars, slope line, path of flight and Calvert are adequate. Others are adequate if attitude is known.
- **Altitude:** Slope line is adequate, all other systems are judged inadequate.
- **Attitude:** Double row with sidebars, path of flight, and Calvert are judged adequate; slope line is termed deficient as interpreted of lateral error is present; others are not to be inadequate.
- **Lateral position:** Slope line is adequate; others are judged inadequate as lateral attitude is level.

CAB Turns Down \$1-a-Year Mail Offer

Application of Air Transport Association, Seattle, and Golden North Airway, Fairbanks, Alaska, for contract between two cities farthest apart between Seattle and Alaska for the normal rate of \$1-a-year have been rejected by the Civil Aeronautics Board.

The two irregular routes and that if they were permitted to operate on a regular schedule they would perform the mail service and save the government without dollars in payments now allotted to Pan American Airways, Northwest Airlines and Pacific Northwest Airlines. CAB noted that the complex and important issues raised by the exceptions request could be handled more appropriately in an application for a certificate.

SHORTLINES

► **At-Loss Pilot Area:** ALPA counsel of Pan American Airways and Panagra are at odds over PAA's request that the Civil Aeronautics Board extend the agreement whereby Panagra pilots serving at Balboa, Canal Zone, from South American points are, together with crews, chartered by PAA and

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Couches Must Pay Off

The critics of air coach are taking an interesting new hue. When the coach was in its heyday during thousands of passengers a week, the established industry scoffed at the coach idea per se. And it smirked at its loss "taking the side of the coach."

All we still see that the coach was serving a new market, and that it looked like a market worth trying to capture—the mass market, that is—and why didn't the scheduled airlines just bring dogs in the manger and try it themselves?

You all know what happened. They did at last get started. Now there are about 20 scheduled coach flights operated in the continental U.S., serving 28 cities.

And we are doing very, very much better. Eddie Rickenbacker, discounting all extra fees for his fastest flights and asking for still more coach service to boot. National debts. Delta wants to resume its late premiums on its DC-6s, too.

And only 30 days after American Airlines starts its daily DC-6 round trip coach service with 70-passenger Suns, its vice president-sales comes out and calls the experiment "an unqualified success." The service actually ran up an 86.4 percent load factor.

So now, instead of nervous wailing that the coach idea will never work for the scheduled airlines, we note the critics have adopted gradually a "let's go slow" attitude, instead. That at least makes sense. We are making progress when we concede that maybe there's something in this idea after all.

We have no bone to pick with those who want to "go slow." Just as long as we do go. But please let's don't have those retreating connections, with their fine group of the division, keeping on fantasizing that we coach-advocates have been "obsessive" in coach service that won't pay off. And that is exactly what a few are doing.

One hard working friend, CAB Chairman O'Connell, for example, in a recent address concludes that "generally speaking, the coach schedules have been successful although there have been some failures." We believe we have reported the failures. And in light of a recent editorial on "Wheels off or T-fans?" we are informed that Mr. O'Connell admits the "Wheels off" approach is a good approach, providing that there is no profit margin. Because, we understand, defeat is the Wood word principle in a profit—not a loss-on-monthly sales.

Then, not wanting to appear too optimistic, the CAB chairman quickly adds, "But if the profit margin turns out to be a loss, then either the airline loses or the government must make up the loss with subsidy payments." Really, Mr. O'Connell, that's not new. We've been all through that. If we watched the postwar airline boom with its so-called "luxury" transportation—which only a paltry fraction of the country's population was able to afford.

We coach advocates squealed long and loud for CAB and the airlines to give the masses a break, offer them an escape, continue these services if they paid off, charge higher fares where the traffic potential demands it. And then if there is too much duplication of service by too many airlines between the same points, and even a reasonable number of coach fare won't pay off for certain

airlines, maybe CAB will finally have its escape for those riding any coach flights the public is not willing to pay for in postage.

We agree with you, Chairman O'Connell, when you say "What we want to know is whether or not each schedule makes economic sense. Does it pay, or not? Does it attract new business or simply divert from existing first class services?" These are the acid tests which must be applied and on which the future of these experiments depends. We might agree that new business is worth more to the industry than the same sum spent on first class service by confirmed air travelers.

But we agree with those who were against "rate reduction or an across-the-board loss." Let's go slow and keep the coach services that pay, kill those that don't. Let performance decide, but let's be careful not to introduce any new golden-deck "cost-accounting formula" into the works to hide actual coach profits.

Let's stop forcing the masses to crawl along in trains and buses if we could fly them to their destinations a lot quicker, at a profit to our industry, with fares close to those charged by ground competition.

We are tired—and we think most taxpayers are—of subsidizing "luxury" service, and think the further Aviation gets away from subsidy the better off it will be—even if its airplanes do get to smother more of business and buses.

New Ideas Will Pay Off

Note to aircraft manufacturers and designers of transport planes: Army weapons, and ground-serving equipment.

We think you will read about the Everett Swearer war games in the issue of Aviation Week with keen interest. The story by our own Military Editor, Ben Lee, appears elsewhere in this issue.

Ground handling of aircraft was woefully inefficient. Much Army material must be redesigned so it can be flown into battle area. Much of it is too heavy. And cargo planes themselves need redesigns to accommodate Army equipment even when ground planes are modernized. We are quick to point out that apparently such modern loading equipment as does exist has not used in the interim.

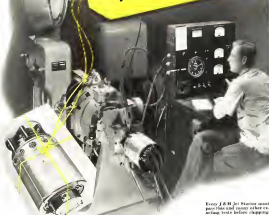
Added to these lessons is the obvious conclusion that the ground and air forces must work together better in solving these common problems. Cooperation up to now has been negligible.

If Operation Swearer does nothing else than knock USAF and Army heads together on re-designing equipment, it will have been a whopping success. The results, of course, could have been forecast by anyone who is familiar with the situation, but the war games—with their excellent press coverage—have dramatized it in nothing else could have done of a tragic war.

It behooves us at though both Army and Air Force will soon be coming to manufacturers of equipment for help and ideas. Funds will be forthcoming eventually. The same manufacturers will already have ideas on tap, and on the drawing boards. Others not so smart will sit quietly waiting for the services to bring detailed specifications. Wonder which group will get more orders?

Robert H. Wood

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